The Impact of Maternal Employment on Child's Mental Health: Evidence from NLSY-Child

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Abstract

An extensive literature has analyzed the effect of a mother's employment on cognitive outcomes of her children. However, the role of maternal employment in a child's noncognitive development has received comparatively scant attention. In this paper, data on a panel of children aged four through fifteen are analyzed to explore the effect of maternal employment on a child's mental health outcomes. Using ordinary least squares and fixed effects estimates, we find that mothers who spend more time at home have children with fewer emotional problems: they score lower on the behavioral problems index; they are also less likely to be frequently unhappy or depressed. In addition, children with mothers spending more time at home are less likely to hurt someone, steal something, or skip school.

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INTRODUCTION

Over the past thirty years, the labor force participation of women with school-age children has increased significantly. The US Census Bureau reports that the labor force participation rate of mothers with school-age children increased from 64 percent in 1980 to 78 percent in 1999. The increase in labor force participation was even larger for single mothers, increasing from 69 percent in 1993 to 83 percent in 1999 (Grogger, 2003). Over the same period of time, the average annual weeks of employment of mothers increased from 29.5 to 36.7. At least a part of the recent surge in mothers' employment is explained by two distinct, but related changes in the economic environment of low-income households: a) a tax-credit expansion (EITC) that is designed to pull mothers towards employment, and b) a welfare reform (TANF) that links welfare receipt with labor market participation.

While both welfare reforms have achieved the goal of increased labor market participation, the increased absence of mothers from home has raised concerns about the potential negative side effects of maternal employment on child development. The ultimate impact of the mothers' employment status on children's outcomes is, however, not immediately obvious. While an increase in market work may yield benefits through additional income, a concomitant reduction in mothers' time at home may have negative effects on her children.

In this paper, I use mother-child matched data from the National Longitudinal Survey of the Youth 1979 cohort (NLSY79) to directly test the effect of mothers' employment on a variety of child outcomes. Using a variety of cognitive and behavioral outcomes for school-age children, we find that in general maternal employment is

correlated positively with children's test scores, and negatively correlated with children's behavioral problems in a standard OLS estimation framework.

These correlations appear, however, to be mostly driven by unobserved heterogeneity at the family level: mothers' labor market status appears to be correlated with other household specific factors that have a positive influence on child outcomes. Using fixed effects, I find no significant relationship between maternal employment and child's cognitive outcomes as measured by the standardized Mathematics and Reading Comprehension tests. I do find, however, a large and significant negative effect of maternal employment on children's non-cognitive development as indicated by the Behavior Problems Index (BPI). On average, children with working mothers are significantly more likely to display distress, anxiety, and similar emotional problems.

The rest of the paper is organized as follows: In Section 2, I describe the existing literature and attempt to highlight my specific contribution. Section 3 outlines the empirical strategy. I discuss the data and present some descriptive statistics in Section 4. The regression results are presented in Section 5. Section 6 concludes.

2. EVIDENCE ON MATERNAL EMPLOYMENT AND CHILD OUTCOMES

An extensive literature analyzes the impact of parental resources on a variety of child outcomes. Korenman *et. al.* (1995), for example, uses NLSY data to show that an increase in current income (1993 dollars) by $10,000 is associated with a small increase in outcome variables measuring cognitive development and behavioral problems. A similar increase in permanent income has a somewhat larger positive effect on both

reading ability and behavioral problems.[2] Blau (1999) uses the EITC expansion of 1993 to examine the impact of a permanent increase in income on child outcomes for the NLSY-Child 1979 cohort. He finds that a (nominal) increase in maximum credit from $953 to $2040, viewed as a permanent increase in income, leads to an increase of at most 1 to 1.5 percent of a standard deviation of the various child outcomes analyzed therein. He concludes that family income (current and permanent) has a negligible impact on child development; family background plays a more vital role in determining child outcomes.

Shea (2000) uses variations in parental 'luck' factors (such as job loss experience) to establish a causal impact of parental income on child outcomes. Echoing the results in the existing literature, he finds a negligible impact of changes in parental income on children's human capital acquisition.[3] Dahl and Lochner (2005) utilize the large expansion in EITC to estimate the causal effect of income on children's math and reading achievement. Using a fixed-effects instrumental variables strategy they find that a $1,000 increase in income raises math test scores by 2.1 percent and reading test scores by 3.6 percent of a standard deviation. The results are stronger for children from families that are affected most by the EITC expansion.

The research cited here allows us to draw some broad conclusions regarding household incomes and child outcomes. Researchers have consistently found that

[2] The largest impact of a $10,000 increase in permanent income is 23.5 percent of a standard deviation in reading ability. With fewer controls, the largest effect is a 35.8 percent of a standard deviation improvement in behavioral problems. The effect of a $10,000 increase in income averages 21.6 percent of a standard deviation of the dependent variable across five different outcomes, when income is initially less than half the poverty line, but averages 7.0 percent of a standard deviation beginning from an income level between 1.85 and three times the poverty line.

[3] The results of Shea (2000) however indicate that parental income does matter in a sample of low-income households.

increases in income have a minor effect on child outcomes. The EITC expansions, by providing generous tax breaks, created an alternative natural experiment setting to test the income effect hypothesis; however the results have still remained surprisingly similar.

A concurrent strand of scholarly work attempts to investigate the importance of the parental employment in child development.[4] Much of the past research on this question has concentrated on the availability of parental time input in the first three years of the child. The primary motivation for concentrating on the first few years is derived from the developmental psychology literature, which emphasizes the effect of early influences on brain development (Blau and Grossberg, 1992).

The other important characteristic of this literature is the widespread use of some measure of a child's cognitive ability as the primary outcome variable. Cognitive development is typically captured by standardized (or raw) test scores of children of different age groups. A variety of recent research in this field finds that maternal employment during the first year of the child's life has a deleterious effect, while that in the second or third years has none or some offsetting positive impact (Waldfogel *et. al.*, 2002; Neidell, 2000). James-Burdumy (2005) uses fixed-effects in determining the effect of maternal employment on child cognitive outcomes (as measured by PPVT, PIAT Math and PIAT Reading scores) in the first three years of the child's life. In particular, she uses a GMM technique to estimate child and mother fixed-effects regressions. She finds that the PIAT Math and Reading scores were negatively affected by maternal employment in the first year. None of the test scores were affected by maternal employment in the second year. Finally, work in the third year positively affected PIAT Math scores. Ruhm

[4] In the absence of detailed time use data, parental employment has often been used as a proxy for the time input in child development (Bernal and Keane 2006).

(2004) finds that adding a more complete set of controls leads to a much stronger negative impact of maternal employment in the first three years of the child's life.[5]

While cognitive skill formation among children has been subject to wide academic scrutiny, the impediments to a child's non-cognitive development have received comparatively scant attention. The literature on investments in children has traditionally focused on standardized tests scores (such as the PIAT Math and Reading), with very little emphasis on non-cognitive outcomes.[6] The recent literature on human capital however argues that in addition to cognitive skills (as measured by test scores), a variety of non-cognitive skills are also very important determinants of subsequent socioeconomic success (Heckman and Krueger, 2004). The study challenges the conventional point of view that equates skill with intelligence, adding that "numerous instances can be cited of people with high IQs who fail to achieve success in life because they lacked self-discipline and of people with low IQs who succeeded by virtue of persistence, reliability and self-discipline". This research therefore cites social skills, motivation and other non-cognitive skills (in addition to basic intelligence) as key to labor market success.

[5] Indeed there is some literature that finds a completely negative effect of maternal employment for all three years of the child (Han *et. al*. 2001, Harvey 1999). Liu, Mroz and van der Klaauw (forthcoming) estimate a structural model of mothers' employment, migration (and hence school) choice, and child outcomes. They also find a negative effect of maternal employment on the cognitive development of children aged 5-15. Bernal (2005) estimates a structural model of employment for married mothers and finds significant negative effects on cognitive achievement of children aged 3-7 years.

[6] Bernal and Keane (2006) surveys a large literature on child outcomes (particularly as a consequence of maternal employment). The survey reveals the strong bias in favor of test scores as the primary measure of child outcomes.

Heckman's concern is reflected in a small but growing literature that attempts to identify the proximate factors that determine or at least influence the development of adolescents' non-cognitive skills. Aizer (2004), for instance, estimates a fixed-effect linear probability model to determine the impact of child supervision after school on the probability of risky behavior (skipping school, getting drunk/high, stealing something and hurting someone). The key explanatory variable is an indicator of whether there is usually an adult present when the child returns from school.[7] The results indicate a lower probability of risky behavior for children monitored by any adult after school. While this research provides an interesting analysis of the determinants of non-cognitive development among school-age children, it does not connect maternal employment (or unemployment) spells with such outcomes. By using a single indicator variable for child supervision (which includes post-school monitoring by any adult or day-care), it potentially misses some interesting effects of the mother's labor market dynamics on child development.

My research is distinguished from existing scholarly work in two ways. First, this paper complements the large literature on very young children by focusing attention on school-age children. In particular I look at the cognitive outcomes for children aged four through fifteen. The cognitive outcomes are measured by scores on Peabody Individual Achievement Tests of Mathematics (PIAT Math) and Reading Comprehension (PIAT Read) measuring academic achievement of children aged five or older. Second, I investigate the impact of maternal employment on non-cognitive outcomes as well. In particular, I assess the effect of maternal employment on Aizer's index of risky behavior.

[7] Children who reported going to day care, or an after-school program, or the home of a relative were considered as being supervised.

In addition, I use the Behavioral Problems Index (BPI) measuring the frequency, range and type of behavior problems of children aged four and over, as an indicator of a child's emotional development.

3. EMPIRICAL FRAMEWORK

The econometric models employed in this analysis are premised on economic models of the family as a production entity as delineated in Becker (1967, 1981), Becker and Tomes (1979, 1986) and Leibowitz (1974). These economic models portray households as productive entities where parents allocate resources (such as income and time) to maximize an objective function that includes the health and development of children as arguments. I use this setup to specify a variety of child outcomes as linear functions of parental resources and a vector of controls in the following form:

$$y_{jt} = X_{jt}\alpha + \beta E_{jt} + \gamma H_{jt} + \varepsilon_{jt} \qquad (1),$$

where y_{jt} is the jth child's outcome in year t, E measures the fraction of weeks mother was employed since last interview (maternal work at the 'extensive' margin), H represents the number of hours worked per week (as a measure of the 'intensive' margin of employment), X is a vector of controls, ε is the error term, and α, β and γ are parameters. The basic models are estimated by ordinary least squares (OLS) with clustered standard errors.

To account for the potential unobservable heterogeneity, I employ a mother fixed-effect to control for unobserved time-invariant factors (such as genetic or environmental

influences) specific to the mother and the household. The fixed-effect model is robust to the endogeneity of any explanatory variables provided that the fixed effect is the only source of correlation between the regressors and the error term. The mother fixed-effect model for the *i*th family is specified as follows:

$$y_{ijt} = X_{ijt}\alpha + \beta E_{ijt} + \gamma H_{ijt} + \theta_{ij} + \varepsilon_{ijt} \qquad (2),$$

where θ_{ij} represents the mother fixed-effect for the *i*th mother or family. The error term can be decomposed into three components: $\varepsilon_{ijt} = \varphi_i + \eta_j + \upsilon_{ijt}$, where φ and η represent the family-specific and individual-specific effects respectively. Assuming that unobservable maternal traits are sibling-invariant ($\theta_{ij} = \theta_i$), and operate only through the family-specific effect φ, one can take first-differences with respect to families to obtain:

$$\Delta y_{ij} = \alpha \Delta X_{ij} + \beta \Delta E_{ij} + \gamma \Delta H_{ij} + \Delta \varepsilon_{ij} \qquad (3).$$

First differencing within families therefore eliminates any observed or unobserved variables that do not vary (over time) within a family. The model is identified under the assumption that the differences in exposure to maternal employment across siblings are exogenous to the children's development.

4. DATA AND DESCRIPTIVE STATISTICS

The National Longitudinal Survey of the Youth has regularly interviewed a national sample of individuals who were aged 14 to 21 as of December 31, 1978. The sample over-represents Blacks, Hispanics, low-income Whites and military personnel. In each even numbered year since 1986, the children born to the female participants of the

NLSY sample have been administered a set of assessments of cognitive, social, emotional and physical development together with the quality of home environment. The data used in the paper are from the first eleven waves of the NLSY Child files collected over the period 1986 to 2006. My sample includes mother-child matched data for children in their school years (i.e. aged about five through eighteen) for whom measures of cognitive and non-cognitive development are available. The particular choice of age group reflects the hypothesis that non-cognitive skill acquisition is most affected by parental time in this age interval.

The primary outcome variables in the second essay are measures of cognitive and non-cognitive development of children. The cognitive outcomes are captured by the scores on the Peabody Individual Assessment Tests of Mathematics (PIATMATH) and Reading Recognition (PIATREAD) that indicate academic achievement for children aged five and above. Following Aizer (2004), I use her index of antisocial or risky child behavior as a measure of the child's non-cognitive development. The index is based on the following specific behaviors: skipping school, getting drunk/high, stealing something and hurting someone bad enough to need a doctor. In addition, the lack of maternal time could lead to nontrivial emotional problems for children and adolescents. Therefore I use the Behavioral Problems Index (BPI) measuring the frequency, range and type of behavior problems of children aged four and over, as an indicator of a child's emotional development.

The two primary explanatory variables measure the mothers' labor market commitments. First, I use the fraction of weeks worked since last interview as a measure

of maternal work at the extensive margin. Second, I use the hours of work per week worked as a measure of work at the intensive margin.

A variety of supplementary 'home' inputs tend to influence a child's development. The 'Home Inventory' variables reported in the NLSY79 are used to summarize the quantity and quality of these supplementary inputs available in the child's home. This measure is derived from a series of child-age-specific questions and interviewer observations on the home environment and the nature of mother-child interactions. In addition, I use a number of core maternal background regressors that are intended to capture the education, demographic characteristics, income and location of the mother.[8]

Along with income, a household's size can often determine the amount of care (specifically, time) allocated to an individual child. In some cases, the birth order and gender of an individual child influences his/her outcomes. Race can often play a significant role in determining the nature and extent of family ties and informal child supervision possibilities. Therefore I add some other controls that capture the child's gender, race, birth order and number of siblings. Finally I also incorporate an indicator for the child's living arrangement, which is equal to 1 if the child stays with the mother and 0 otherwise. Table 1 outlines the descriptive statistics for the variables used in this essay.

[8] For mother's education, we use information on the highest grade completed by mother. I have not included mothers' AFQT test results because there is little consensus in the literature on what the score really measures.

5. RESULTS

The main regression results for four different outcome variables are presented in Tables 2 to 4. Tables 2 and 3 present estimates of the effect of maternal employment on PIAT Math and Reading scores. The OLS results in both tables indicate a strong impact of maternal work (on both the 'extensive' and 'intensive' margins) on cognitive achievement. However the effect ceases to be significant when I use mother fixed-effects. The basic positive correlation appears to be mostly driven by mother and household-specific factors that are positively correlated with both income and employment and thus generate a classical omitted variable bias in the OLS estimates. Even with household fixed effects, however, the measure of home inputs turns out a highly significant determinant of child's cognitive outcomes and is robust to changes in specification or sample. These results strongly highlight the importance of home environment on a child's cognitive development. The results reported in Tables 2 (Math) and 3 (Reading and Comprehension) look overall very similar. Overall maternal employment appears to be slightly more detrimental for boys (column 3 of Tables 2 and 3), even though the estimate is significantly different from zero only for the reading and comprehension score.

Table 4 presents estimates of the effect of maternal employment on a child's emotional well-being as reflected by the BPI score. While the OLS results do not show significant results, all the specifications with mother fixed-effects indicate that maternal employment at the 'extensive' margin has a highly significant effect on behavioral problems. In particular, it appears that a larger number of weeks of employment for a mother significantly exacerbated behavioral problems for her children. These results appear to be very robust across sampling strata; the magnitudes and significance of the

coefficients change very little when I restrict the sample to boys (column 3), African Americans (column 4) or Hispanics (column 5). The number of hours worked per week, on the other hand, has little impact on the BPI score. Home inputs turn out to be important determinants of a child's emotional well-being, with a higher quality of home environment significantly reducing behavioral problems. Two other interesting points emerge. In all the specifications, first and second born children do much better than their younger siblings in dealing with behavioral problems. Finally, girls fare significantly better than boys on BPI score across all specifications and samples.

In Table 5, I test the effect of maternal employment on a behavioral problem index suggested by Aizer (2004). The dependent variable is an indicator, which is coded to 1 if the child has either stolen, skipped school, got drunk or hurt anybody. The results are mixed, and somewhat hard to interpret. The OLS results imply that more hours per week lead to higher scores on child risky behaviors, but more participation in the labor market is associated with lower behavioral problems. This positive effect of labor force participation disappears in the full sample once I control for mother fixed effects. It does, however, persist in the male sample. The interpretation of this finding is not straightforward. Given the self-reported nature of the behavioral problems index, one might argue that boys with working mothers tend to report less of their bad deeds.

6. CONCLUSIONS

With rapidly increasing female labor force participation over the last few decades, a lot of research has been dedicated to identifying the causal effect of maternal work

during early childhood on subsequent child development; relatively little attention has been given to the effect of maternal employment during the later stages of childhood (as well as early adulthood). In this paper I have used longitudinal data from the US to test whether a mother's attachment to the labor market during the ages 5-14 significantly affects a child's cognitive and non-cognitive development. While we find that maternal employment has no effect on the cognitive development of children, we find a strong and highly significant relationship between maternal employment and the frequency and severity of children's behavioral and psychological problems as summarized in the Behavioral Problems Index (BPI). This effect appears to be consistent across gender and ethnicities.

The results in this paper not only highlight the important impact maternal employment during childhood and early adulthood may have on child development; they also underline the very differential effects parental choices may have on the psychological and mental well-being of their children. While parental employment is likely to have only an indirect positive effect on children's school performance, it appears to have a rather important negative effect on the child's emotional well-being. Even though the magnitude of these effects may be harder to quantify than the consequences of poor performance in school, they should clearly not be neglected from a broader welfare perspective.

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Table 1: Descriptive Statistics from NLSY-Child 1979

Variable	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
PIAT Math Raw Score	22894	100.20	13.91	0	135
Behavioral Problems Index Score	22894	64.23	62.39	0	280
Age	22894	9.57	2.81	4.916667	18.08333
Age mother	22894	33.99	5.08	21	47
African American	22894	0.30	0.46	0	1
First born child	22894	0.44	0.50	0	1
Hispanic	22894	0.20	0.40	0	1
Lives with mother	22894	0.98	0.14	0	1
Sibling under age 2 or younger	22894	0.17	0.37	0	1
Mother age at birth	22894	24.40	5.00	11	40
Number of siblings	22894	2.61	1.19	0	9
Home inventory score	22894	974	157	80	1333
Mother education	22894	12.57	2.31	0	20
Family income	22894	43633	68783	0	974100
Urban area	22894	0.75	0.44	0	1
Mother married	22894	0.62	0.49	0	1
Mother single	22894	0.14	0.35	0	1
Fraction employed	22894	0.63	0.43	0	1
Fraction unemployed	22894	0.04	0.14	0	1

Table 2: PIAT Math Scores and labor market participation

Dependent Variable	Standardized PIAT Math Score				
	(1)	(2)	(3)	(4)	(5)
Fraction of year employed	1.288***	-0.0464	-0.270	0.0454	0.630
	(0.45)	(0.43)	(0.60)	(0.77)	(0.93)
Average hours per week	-0.0440***	-0.0109	-0.0000362	-0.0213	-0.0324*
	(0.010)	(0.0095)	(0.013)	(0.018)	(0.020)
Number of siblings	-0.504***	-0.296	-0.300	-0.340	-0.698
	(0.17)	(0.25)	(0.41)	(0.39)	(0.49)
Home inventory score	0.0115***	0.00494***	0.00424***	0.00576***	0.00307
	(0.00098)	(0.00092)	(0.0013)	(0.0015)	(0.0020)
Sample	All	All	Boys only	Black	Hispanic
Specification	OLS	FE	FE	FE	FE
Observations	17468	17468	17468	17468	17468
R-squared	0.18	-63.09	0.55	0.64	0.50

Robust standard errors in parentheses are clustered at the family level.
*** p<0.01, ** p<0.05, * p<0.1
All specifications control for sex, birth order, ethnicity, living with mother, mother's marital status and education, and urban residence.

Table 3: PIAT Reading and Comprehension Score and Labor Market Participation

Dependent Variable	Standardized PIAT Reading and Comprehension Score				
	(1)	(2)	(3)	(4)	(5)
Fraction of year employed	1.704***	0.0267	-1.201*	0.428	-0.240
	(0.44)	(0.46)	(0.65)	(0.80)	(0.99)
Average hours per week	-0.0451***	-0.0131	-0.00688	-0.0163	-0.00785
	(0.010)	(0.010)	(0.016)	(0.021)	(0.026)
Number of siblings	-0.546***	-0.183	0.194	-0.354	-0.377
	(0.16)	(0.26)	(0.36)	(0.42)	(0.63)
Home inventory score	0.0114***	0.00434***	0.00301**	0.00468***	0.00276
	(0.0010)	(0.0010)	(0.0015)	(0.0016)	(0.0023)
Sample	All	All	Boys only	Black	Hispanic
Specification	OLS	FE	FE	FE	FE
Observations	14828	14828	7330	4432	2811
R-squared	0.23	0.59	0.68	0.61	0.53

Robust standard errors in parentheses are clustered at the family level.
*** p<0.01, ** p<0.05, * p<0.1
All specifications control for sex, birth order, ethnicity, living with mother, mother's marital status and education, and urban residence.

Table 4: Behavior Problems Index (BPI) and Labor Market Participation

Dependent Variable	Behavioral Problems Index (BPI) Raw Score				
	(1)	(2)	(3)	(4)	(5)
Fraction of year employed	2.658	12.18***	13.13***	13.48***	12.27**
	(2.50)	(2.56)	(3.49)	(4.71)	(5.69)
Average hours per week	0.00496	-0.0820	-0.118	-0.0762	-0.227*
	(0.054)	(0.055)	(0.078)	(0.11)	(0.12)
Number of siblings	-2.576***	4.468***	4.117**	4.537*	7.238***
	(0.83)	(1.25)	(1.73)	(2.39)	(2.36)
Home inventory score	-0.0846***	-0.0347***	-0.0219***	-0.0337***	-0.0387***
	(0.0052)	(0.0052)	(0.0075)	(0.0092)	(0.011)
Sample	All	All	Boys only	Black	Hispanic
Specification	OLS	FE	FE	FE	FE
Observations	17468	17468	8755	5134	3355
R-squared	0.07	0.53	0.60	0.51	0.52

Robust standard errors in parentheses are clustered at the family level.
*** p<0.01, ** p<0.05, * p<0.1
All specifications control for sex, birth order, ethnicity, living with mother, mother's marital status and education, and urban residence.

Table 5: Aizer Behavioral Index and Labor Market Participation

Dependent Variable	Aizer Behavioral Problem Index				
	(1)	(2)	(3)	(4)	(5)
Fraction of year employed	-0.0508**	-0.0117	-0.133**	-0.0643	-0.0172
	(0.026)	(0.040)	(0.064)	(0.073)	(0.084)
Average hours per week	0.00114**	-0.00114	-0.000712	-0.00166	-0.00126
	(0.00048)	(0.00086)	(0.0012)	(0.0018)	(0.0019)
Number of siblings	0.0126**	-0.0518***	-0.0695**	-0.0971***	-0.00345
	(0.0064)	(0.020)	(0.034)	(0.032)	(0.046)
Home inventory score	-0.000175***	-0.000185**	-0.000146	-0.000249*	-0.000120
	(0.000051)	(0.000074)	(0.00012)	(0.00013)	(0.00015)
Sample	All	All	Boys only	Black	Hispanic
Specification	OLS	FE	FE	FE	FE
Observations	6011	6011	2966	1785	1204
R-squared	0.07	0.49	0.62	0.49	0.51

Robust standard errors in parentheses are clustered at the family level.
*** p<0.01, ** p<0.05, * p<0.1
All specifications control for sex, birth order, ethnicity, living with mother, mother's marital status and education, and urban residence.
The dependent variable is coded to 1, if child reports to have either, stolen, got drunk, skipped school or hurt somebody.